

## THE PREDICTOR FACTORS OF OBESITY RISK IN RURAL ADULTS IN CIHANJUANG RAHAYU VILLAGE

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### Abstract

*Obesity is known as a risk factor for non-communicable diseases such as heart disease, hypertension, stroke, diabetes mellitus, and cancer. These diseases have become the top cause of death both globally and nationally. This study aims to investigate the relationship between demographic factors and the risk of obesity. This study utilized a quantitative method with a descriptive correlation approach. The respondents of this study were the Cihanjuang Rahayu villagers aged 26–45 years old that are selected by using an accidental sampling technique. A total of 150 respondents signed the informed consent to participate in this study. The data analysis using the chi-square test showed a significant relationship between gender, age, occupation, marital status, and BMI ( $p < 0.05$ ). There is no significant relationship between income and BMI ( $p > 0.5$ ). Female, married, middle age, and housewives are more likely to be obese. Thus, people with these characteristics are encouraged to maintain their BMI in the normal range. Future research could examine other factors that influence BMI such as nutritional intake.*

**Keywords:** BMI, Obesity, Predictor, Rural

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### Introduction

Obesity or being overweight is one of the factors that have a negative impact on our health. Based on WHO data released in 2020, approximately 1.9 billion (39%) of the population aged 18 and up had gained weight and became overweight, with 650 million (13%) being obese, (WHO, 2020). In comparison to being underweight, being overweight has killed many more people. In Indonesia, 13.6% of adults aged 18 above are overweight, while 21.8% are obese. Meanwhile, North Sulawesi had the highest obesity rate (30.2%), followed by DKI Jakarta (29.8%) and West Java (23.0%) (Kementrian Kesehatan RI, 2018).

Overweight is harmful to our health, research on the effects of overweight and obesity on the liver has discovered a significant improvement in alanine aminotransferase (ALT), indicated damage to the liver function (Magnus J Johansen, Julie Gade, Stefan Stender, Christine Frithioff-Bøjsøe, Morten A V Lund, Elizaveta Chabanova, Henrik S Thomsen, Oluf Pedersen, Cilius E Fonvig, Torben Hansen, 2020). Obesity contributed about 14.5 (CI 95%) to hypertension, which is one of the causes of heart disease, stroke, and kidney failure, according to a study conducted on men in Tehran's Mazandaran Province, (Mohammadi and Masoud, 2017).

The increase in Body Mass Index (BMI) shows a significant correlation with the incidence of uric acid, also known as hyperuricemia, according to a study conducted on 70 adults, both males, and females, ranging in age from 20 to 60 years old and the study concluded that the higher the BMI, the higher the uric acid level, (Leokuna and Malinti, 2020). High uric acid levels in the blood cause negative affect, such as the increase of gout that causes severe pain in the joints, affecting activity and productivity, (Benn *et al.*, 2018).

A study was conducted on 60 adolescents aged between 15 to 18 years old, the group in this study was divided into two: the obesity group and the non-obesity group. The purpose of this study was to examine hemoglobin levels. The analysis results revealed that Hemoglobin levels in the obesity group were lower than those in the non-obesity group, though the difference was not statistically significant, (Nisa, Nissa and Probosari, 2019). Hemoglobin is essential for transporting oxygen to tissues via blood vessels. The quantity of Hemoglobin and the flow of microcirculatory blood influence the oxygen supply to the tissues.  $\beta$ Cys93 is known as the main site of Hb S-nitrosylation has a substantial influence on the

flow of microcirculatory blood. Deoxygenated Hb will release SNO from  $\beta\text{Cys93}$ , and SNO vasodilates the blood vessels, allowing oxygen to enter the tissue more easily, (Premont and Stamler, 2020).

Another study included 70 adolescents, 35 in the case group and 35 in the control group. The samples of this study were taken from both urban and rural areas in equal numbers. According to the result of the study, the same factor that contributes to the obesity epidemic among urban and rural adolescents is lack of physical activity, (Fajriyah, 2019). A study was conducted in Kulon Progo village with 236 respondents ranging in age from 18 to 65 years old to find out the relationship between physical activity and obesity status, with 51.44% of women engaging in strenuous physical activity and 30.45% of men engaging in strenuous activity. A total of 52.12% were obese, with women ranging in age from 36 to 65 years old predominating. According to the result of the study, there was no significant relationship between obesity and physical activity, (Christianto *et al.*, 2018).

Based on the problems described in the previous studies above, the researchers would like to examine the predictor factors of obesity risk in rural adults in Cihanjuang Rahayu Village.

## Methods

The research design used in this study is the quantitative descriptive correlational method to correlate the demographic variables to BMI. Respondents in this study were people in their early and late adulthood who live in the Cihanjuang Rahayu village. The non-probability sampling technique was used to select the respondents, and the researchers met the people of the Cihanjuang Rahayu village, the respondent should match the criteria of the study and are willing to sign the informed consent to be included as respondents in this study.

After obtaining a research permit, the researchers visited potential respondents who matched the criteria and indicated their willingness to participate by signing informed consent. The collection of the data was taken between January and February 2020. Before the respondents signed the informed consent, the researchers provided a clear explanation to the respondents regarding this study, the respondents have the option of whether or not to participate in this study.

The measurement used in this study is a calibrated digital scale to measure the weight. The researchers put the scale on a flat surface, and the respondents weighed while wearing shirts and trousers for men and skirts for women. The researchers instructed the respondents to stand upright until the digital number on the scale stabilized; the measurement used was in kilograms. Furthermore, the respondents' height was measured in centimeters using a stature meter. The result obtained from the measurements, weight in kilograms, height in centimeter inputted into the application. The findings were recorded and classified following WHO guidelines for the general population. The chi-square analysis was used to examine the relationship between the predictor factors and the prevalence of obesity.

Table 1. The classification of BMI based on WHO standards for the general population

BMI	Classification
< 18,5	Underweight
18,5 – 24,9	Normal
25 -29,9	Overweight
≥ 30	Obesity

Source: WHO 2016

## Results

The univariate analysis was used for demographic data such as gender, age, occupation, income, marital status, and BMI, and the bivariate analysis was used to examine the relationship between the predictor factors and BMI.

Table 2. Data on respondent demographics based on; Gender, Age, Occupation, Income, Marital Status, and BMI.

Variable	Category	Frequency	Percent
Gender	Female	74	49.3%
	Male	76	50.7%
Age	Young Adult	72	48%
	Mid Adult	78	52%
Occupation	Housewife	42	28%
	Employee	14	9.3%
	Businessman	37	24.7%
	Farmer	44	29.3%
Income	College Student	13	8.7%
	0-1.49 million	71	47.3%
	1.5-2.99 million	47	31.3%
Marital Status	> 3 million	32	21.3%
	Single	32	21.3%
	Married	118	78.7%
BMI	Normal	52	34.6%
	Overweight	28	18.7%
	Obesity	70	46.7%

Source: Primary data (2020)

Table 2 summarizes the demographic data of the respondents based on gender, with 74 females (49.3%) and 76 males (50.7%). There were 72 early adults (48%) and 78 middle adults (52%). There were 42 housewives (28%), 14 employees (9.3%), 37 businessmen (24.7%), 44 farmers (29.3%), and 13 college students (8.7%). In terms of income, there were 71 respondents with 0-1.49 million (47.3%), 47 with 1.5-2.99 million (31.3%), and 32 with more than 3 million (21.3%). Based on marital status, 32 respondents were single (21.3%), and 118 were married (78.7%) while based on the BMI there were 52 respondents were normal (34.6%), 28 were overweight (18.7%), and 70 were obese (46.7%).

Table 3. The relationship between obesity risk predictors and body mass index (BMI)

Variable		BMI			p-value
		Normal	Overweight	Obesity	
Gender	Female	16	12	46	.001
	Male	36	16	24	
Age	Young Adult	34	11	27	.008
	Mid Adult	18	17	43	
Occupation	Housewife	9	3	30	.001
	Businessman	10	10	17	
	Employee	7	3	4	
	Farmer, Labor	16	11	17	
Income	University Student	10	1	2	.345
	0-1.49 Mio	29	9	33	
	1.5-3 Mio	15	11	21	
Marital Status	>3 Mio	8	8	16	.000
	Single	20	3	9	
	Married	32	25	61	

Significant Value  $\alpha < 0.05$

Table 3 describes the relationship between BMI and gender, age, occupation, income, and marital status. Women with normal BMI were 16, 12 were overweight, and 46 were obese, while men with normal BMI were 36, 16 were overweight, and 24 were obese. The statistical analysis showed that there was a significant relationship between gender and BMI with a p-value of .001, where women were having a higher BMI average than men.

## Discussions

The BMI of the early adults, 34 were normal, 11 were overweight, and 27 were obese, then the middle adults 18 were normal, 17 were overweight, and 43 were obese, with a p-value of .008 indicating that the BMI of the middle adults was higher than the early adults. In terms of occupation, housewives: there 9 were normal, 3 were overweight, and 30 were obese. Businessman: there 10 were normal, 10 were overweight, and 17 were obese. Then, for employees there 7 were normal, 3 were overweight, and 4 were obese. Farmers and laborers: there 16 were normal, 11 were overweight, and 17 were obese. College students: there 10 were normal, 1 was overweight, and 2 were obese, with a p-value of .001 or it was indicated that housewives have a higher BMI compared to other occupations or professions. In terms of income: from 0-1.49 million, 29 were considered normal, 9 were considered overweight, and 33 were considered obese. From 1.5 - 3 million: 15 were normal, 11 were overweight, and 21 were obese. For more than 3 million: 8 were normal, 8 were overweight, and 16 were obese, with a p-value of .345 or it was not significant. In terms of marital status, single: 20 were normal, 3 were overweight, and 9 were obese. Married: 32 were normal, 25 were overweight, and 61 were obese, with a p-value of .000 interpreted as significant.

The findings of this study were consistent with the result of, (Lubis *et al.*, 2020) on 60 male and female respondents who were classified as obesity and non-obesity groups. There were 71.4% of women while 20% of men were obese. The chi-square test results with a p-value of .001 revealed a significant relationship between gender, wherein women have a higher obesity risk than men with an OR value of 7.500, or women having 7.5 times the risk of obesity compared to men. The study, which included 55 women aged 20 to 49, discovered that 63% were obese and 13% were overweight, (Malinti and Malinti, 2020).

However, the findings of this study are different from a study conducted in Banjaroyo village with 65 respondents ranging in age from 18 to 65 years old, with 46 females as respondents, there were 22 were obese compared to 19 men and there were 6 obese men, with a p-value of .299 indicating that there was no significant difference, (Christianto, 2017). The general description showed in the study that was conducted on 136 men and women between the ages of 18 to 50, the respondents with normal BMI were 35%, 18% was overweight, and 47% was obese, or 65% had a high BMI, (Oktaviana and Malinti, 2020).

This study was based on the findings of research conducted on andropause men aged 40-60 years old, with a total of 48 respondents. The study findings showed that there was a significant relationship between age and the progression of BMI, with a p-value of .000, (Annis, 2009). Another study was carried out on women between the ages of 26 to 45 in Cihanjuang Rahayu village. 85% of those respondents were obese, while the remaining 15% were overweight, (Elon and Paul, 2020).

The same case was examined in a study of 68 workers with a ratio of 3:1, where the case group consisted of 48 respondents and the control group consisted of 16, with the age group ranging from 26 to 45 years old. The data examined were based on the outcomes of medical examinations that met the inclusion criteria. According to the findings of this study, there was a significant relationship between age and being overweight or obese, (Maudyna, 2019).

According to the findings of a study of 45 early and late adults, 42.2% were overweight, and 31.1% were obese, or in other words about approximately 73.3% of the respondents had an abnormal weight, (Nurdamayanti and Elon, 2019). However, a study on 67 adolescents aged 9 to 15 years old has discovered that there was no significant relationship between the age and the increase of BMI on the adolescents, (Putri *et al.*, 2015).

The findings of this study were in line with the results of the research conducted in Mokla village, where the majority of the respondents between the ages of 26 to 45 years old, were housewives or were working as employees with a BMI status, there were 85% being obese and 15% being overweight, (Elon and Paul, 2020). This finding was supported by a study of 80 female laborers that divided into two groups: obesity and non-obesity. The study findings revealed the escalation of the relationship between physical activity and BM, (Suji, 2019a).

The results of this study are in line with research conducted on 40 subjects aged 15-18 years old who were divided into 20 obesity case groups and 20 control or non-obesity groups. The study concluded that there was no significant relationship between the incidence of obesity and the level of the family income, (Suji, 2019b). Nonetheless, the findings

of this study contrast with a study conducted in China that attempted to determine the relationship between family income and BMI, since the variation in individual choices of primary needs increased with the income.

Data from the longitudinal China Health and Nutrition Survey (CHNS) using cross-sectional and panel data to see the causal effect. Where BMI has grown among low-income families, this is because individuals with low incomes do not pay as much attention to obesity; instead, they focus on meeting their fundamental needs, so as their income rises, they are more likely to gain weight, (Asiseh and Yao, 2016).

The findings of this study are consistent with a previous study conducted in Plalangan, where the respondents ranged in age 26 to 45 years old, with 93 (91.2%) married respondents and 9 (8.8%) single respondents. 65 (69.9%) of all married respondents were obese, (Puspitasari, 2018). The same findings were found in a study of 44 married women who had infertility, with 35 respondents or (76.1%) were being obese, (Susilawati and Restia, 2019).

Whilst research was done on 60 unmarried high school students from the class of X, XI, and SMA I, 7 (11.7%) were underweight, 50 (83.3%) were normal, 3 (5%) were obese. The data showed that BMI level was in the normal category, (Kurniawati and Yulinda, 2017).

## Conclusion

The results of the study indicated that there was a significant relationship between BMI and gender, with women have a higher level of obesity compared to men. There was a significant relationship between BMI and age, with middle adults have higher BMI than early adults. Additionally, there is a significant relationship of the higher BMI in the housewives group. In terms of income, there was no significant relationship between low and high-income groups, however those who have low incomes tend to have a higher BMI, and there was a significant relationship between marital status and BMI, with those who were married have a high BMI. Future research is expected to add more variables such as intake calories, fat and fiber, and family history.

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